

WHAT IS CLAIMED IS:

1. A double starwheel unit comprising:

a sleeve having an upper portion, a middle portion and a lower portion sequentially arranged, with a central hole passing throughout the upper portion,

5 the middle portion and the lower portion; and

a first and a second starwheels parallel-arranged in an upper-and-lower manner and respectively having first and second external teeth and first and second internal edges, the first internal edge disposed between the upper portion and the middle portion, the second internal edge disposed between the 10 middle portion and the lower portion, both the first and the second internal edges respectively having first and second gear-wheel holes formed therein and relating to the central hole, and the first and the second external teeth being exposed thereby.

2. The double starwheel unit of claim 1, wherein the sleeve is cylindrical in

15 shape, and the middle portion is thicker than the upper portion and the lower portion.

3. The double starwheel unit of claim 1, wherein the first and the second internal edges respectively have a plurality of projections protruding inwardly and arranged symmetrically.

20 4. The double starwheel unit of claim 1, wherein the first and the second starwheels are respectively shaped like a plate, and the first and the second external teeth respectively have a conjunction point connecting each of the first and the second starwheels to a sheet-like substrate.

5. An instrument adopted for fabricating a plurality of double starwheel units

25 in multiple rows with a multi-hole manner, comprising:

a plate-like assembly fixture having a plurality of strip-like tools parallel to

each other and connection mechanisms arranged thereon and connecting alternately between the strip-like tools, wherein each strip-like tool has a plurality of recesses respectively formed in two opposing longitudinal sides, the plate-like assembly fixture includes a module hole formed both by each of the 5 recesses of the strip-like tools and a next recess relating thereto, and each double starwheel unit includes a gear-wheel hole formed therein and oriented in the module hole; and

an orientation mechanism engaging with or disengaging from each strip-like tool and a next strip-like tool relating thereto.

10 6. The instrument of claim 5, wherein:

the plate-like assembly fixture connects to an exterior mold, wherein the exterior mold includes a plurality of module slots, a plurality of posts arranged in the module slots, and a plurality of injection holes communicating with the module slots;

15 the exterior mold covers the plate-like assembly fixture and closely presses external teeth of each double starwheel unit arranged on upper and lower surfaces of the plate-like assembly fixture, respectively;

the gear-wheel hole communicates with the module hole, wherein a circumference thereof ranges between that of the gear-wheel hole and that of 20 the external teeth; and

each module slot corresponds to the module hole and each post penetrates through the module hole and the gear-wheel hole;

whereby a working fluid is injected into the injection holes in the exterior mold and into the module hole, the working fluid transforms into a sleeve and 25 each posts retains a central hole therein, the sleeve connects the two double starwheels arranged respectively on each upper and lower surface of the

plate-like assembly fixture to shape a double starwheel unit oriented in the module hole.

7. The instrument of claim 5, wherein:

the orientation mechanism includes a housing, a horizontal reciprocal power source and a retractable assembly mechanism;

the housing has a front side and a rear side relating to the front side; and

the horizontal reciprocal power source is disposed on the front side of the housing and has a lateral telescopic lever parallel to a horizontal direction of the housing, the retractable assembly mechanism includes a front-end face and a rear-end face relating to the front-end face, the front-end face connects the lateral telescopic lever and slides on the housing, and the rear-end face connects the rear side of the housing.

8. The instrument of claim 7, wherein:

each strip-like tool includes an orientation hole formed therein, the plate-like assembly fixture and the double starwheel units are arranged on the retractable assembly mechanism, and the retractable assembly mechanism includes an orientation plate, a reception plate, an orientation pin, a collection pin and a linkage mechanism;

the orientation plate is arranged alternately with the reception plate, wherein each front-end face and rear-end face of the retractable assembly mechanism is the orientation plate;

the linkage mechanism is arranged between the orientation plate and the reception plate for extending and retracting;

the orientation plate has a first lengthwise hole for the orientation pin to connect therein, and the orientation pin has a top exposed by the first lengthwise hole;

each strip-like tool corresponds to the orientation plate and the orientation hole sleeves on the top of the orientation pin;

the reception plate has a second lengthwise hole formed therein for receiving the collection pin therein, and the collection pin has a top exposed by

5 the second lengthwise hole; and

the central hole of each of the double starwheel unit relatively sleeves on the top of the collection pin.

9. The instrument of claim 8, wherein:

the linkage mechanism includes a secure hole, a pivot hole, a reception

10 hole, a pivot pin and a secure pin;

the secure hole, the pivot hole and the reception hole are respectively formed on two adjacent orientation plates and the reception plate, and the orientation plates and the reception plate respectively have an insertion hole communicating with the secure hole;

15 the linkage mechanism further includes a limitation slot formed in the pivot hole and facing a retraction direction of the retractable assembly mechanism;

the pivot pin has a through hole formed in an end thereof and an expansion limitation portion arranged in an opposing end thereof and facing a retraction 20 direction of the retractable assembly mechanism;

the pivot pin penetrates through the pivot hole and the secure hole, the secure pin inserts into the insertion hole, the secure hole and the through hole for orienting the pivot pin in the secure hole; and

the expansion limitation portion mates with the limitation slot for pivoting

25 on the reception hole.

10. The instrument of claim 8, wherein the housing includes a base, and an

upper groove is formed in the base and parallel to the horizontal direction, the orientation plate and the reception plate each having a lower protrusion mating with the upper groove.

11. The instrument of claim 10, wherein the housing includes two opposing lateral bases respectively disposed on two opposing sides of the base and parallel to the horizontal direction, each opposing lateral base has an inner raised strip and a lateral groove formed between the inner raised strip and the base, both the orientation plate and the reception plate respectively have two opposing edges, and each opposing edge slidably mates with the inner raised strip.

12. The instrument of claim 11, wherein:

the orientation mechanism includes a vertical reciprocal power source, a top-retention plate, a plurality of pillars and a top plate;

the vertical reciprocal power source and the top-retention plate are disposed beneath the base;

the top plate is arranged between the plate-like assembly fixture and the retractable assembly mechanism;

the vertical reciprocal power source includes a longitudinal telescopic lever defining a vertical direction and is vertical to the plate-like assembly fixture;

the top-retention plate connects to the end of the longitudinal telescopic lever;

the base has a plurality of through holes;

each pillar has an end connecting to the top-retention plate and an opposing end penetrating through each of the through holes of the base to connect to the top plate, and the top plate restrictedly moves on the inner raised

strip;

the top plate has a plurality of guiding slots formed therein and a plurality of partitions all parallel to the horizontal direction; and

5 the orientation pin and the collection pin each penetrate into each of the guiding slots and are actuated therein.

13. The instrument of claim 11, wherein:

each connection mechanism includes two clips parallel to each other, and the two clips respectively have two embedded slots relating to each other;

10 each strip-like tool has two opposing ends clamped by the two clips into the two embedded slots in a one-on-one manner to combine the strip-like tools with the plate-like assembly fixture; and

the lateral base has a concave portion formed in a top face thereof to allow the two clips to straddle the concave portion, the two clips clamping on or off the two opposing ends thereby.

15 14. The instrument of claim 11, wherein the horizontal reciprocal power source connects to a fixed plate, the fixed plate being disposed on the base and the lateral base, the orientation plate of the retractable assembly mechanism connecting to a connection plate, and the lateral telescopic lever of the horizontal reciprocal power source movably penetrating through a shaft hole of 20 the connection plate.

15. The instrument of claim 10, wherein the orientation plate of the retractable assembly mechanism has a fixed clip connecting the base.

16. A method adopted for fabricating a plurality of double starwheel units in multiple rows with a multi-hole manner, comprising:

25 (a) obtaining a plurality of strip-like tools parallel to each other and arranged increasingly closer to be combined with a plate-like assembly fixture,

the strip-like tools each having a plurality of recesses formed in two opposing longitudinal sides thereof, and a plurality of module holes formed by each of the recesses and a next recess relating thereto;

- (b) retaining two sheet-like substrates against an upper surface and a lower surfaces of the plate-like assembly fixture, the two sheet-like substrates each having a plurality of starwheels respectively relating to the module holes, wherein each has a circumference ranging between that of the gear-wheel hole and that of external teeth of each of the starwheels;
- (c) covering the plate-like assembly fixture with an exterior mold, and closely pressing the external teeth arranged on the upper and lower surfaces of plate-like assembly fixture;
- (d) injecting a working fluid into an injection hole in the exterior mold and into the module holes therein, and transforming the working fluid into a sleeve to connect the starwheels of the two sheet-like substrates on the upper and the lower surfaces of the plate-like assembly fixture relating to each other for shaping a plurality of double starwheel units respectively oriented in the module holes;
- (e) removing the exterior mold;
- (f) removing a plurality of residents of the two sheet-like substrates; and
- (g) separating the strip-like tools from the double starwheel units.

17. The method of claim 16, wherein the plate-like assembly fixture of step (a) straddles a lateral base of an orientation mechanism, the strip-like tools each having an orientation hole sleeved on an orientation pin of a retractable assembly mechanism, wherein the retractable assembly mechanism is disposed on the orientation mechanism in a retracted state, and step (a) further includes moving two clips of the plate-like assembly fixture and sleeved an embedded

slot of each of the clips on an end of each of the strip-like tools for combining the strip-like tools with the plate-like assembly fixture, raising a longitudinal telescopic lever of a vertical reciprocal power source of the orientation mechanism up for a plurality partitions of a top plate of the orientation mechanism to be retained against the plate-like assembly fixture, so that the orientation hole and the module hole removed the orientation pin and the collection pin of a retractable assembly mechanism.

18. The method of claim 17, wherein the exterior mold of step (c) further includes an upper mold and a lower mold, and step (c) further includes arranging one of the sheet-like substrates in the lower mold to be closely pressed.

19. The method of claim 18, wherein the retractable assembly mechanism of the orientation mechanism of step (g) is in a retracted state, while the plate-like assembly fixture straddles the partitions of the top plate of the orientation mechanism, the strip-like tools relates to an orientation plate of the retractable assembly mechanism, downwardly shifting a longitudinal telescopic lever of the vertical reciprocal power source of the orientation mechanism to carry the plate-like assembly fixture to the lateral base of the orientation, the orientation hole of each of the strip-like tools and a central hole of each of the double starwheel units sleeves on the orientation pin and the collection pin of the retractable assembly mechanism, further separating the two clips for extending out the retractable assembly mechanism by a lateral telescopic lever of a horizontal reciprocal power source of the orientation mechanism, the orientation plate of the retractable assembly mechanism separates from a reception plate of the retractable assembly mechanism, the strip-like tools are actuated to slip by the orientation pin, so that the module hole expands to be

larger than the external teeth, and each double starwheel unit separates from the exterior mold and falls to sleeve on the collection pin.